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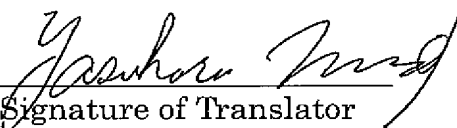
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Signed this 28th day of February, 2007

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(54) [Title of the Invention] Facsimile System

(57) [Abstract]

[Object] To provide a facsimile system capable of carrying out real time facsimile communication using the Internet even when a facsimile machine is connected to a local system.

[Solving means] A facsimile machine 12 is certified by identifying information after being connected to a relay server 4, and maintains the connection after that. A facsimile machine 22 is similarly connected to the relay server 4, and maintains the connection. When the facsimile machine 12 transmits an image to the relay server 4 after the facsimile machine 12 sends a connection demand directed to the facsimile machine 22 to the relay server 4 to enable communication between the facsimile machines, the relay server 4 relays the image and transmits the image to the facsimile machine 22. Since the facsimile machine 22 is connected to the relay server 4 in advance, it can receive the transmission of the image from the relay server 4.

[What Is Claimed Is:]

[Claim 1] A facsimile system comprising:

facsimile machines connected to an inner network;
gateway devices for connecting the inner network to an
outer network; and

a relay server connected to the outer network for relaying
communication between said gateway devices,

wherein said facsimile machines send and receive an image
by being connected to said relay server via said gateway devices
in advance.

[Claim 2] A facsimile system comprising:

facsimile machines connected to an inner network;
gateway devices for connecting the inner network to an
outer network; and

a plurality of relay servers connected to the outer
network,

wherein said relay servers carry out communication with
one or a plurality of gateway devices and one or a plurality
of other relay servers to relay between said gateway devices,
and

said facsimile machines send and receive an image by being
connected to any one of said relay servers via said gateway
devices in advance.

[Claim 3] The facsimile system according to any one of Claim
1 and Claim 2, wherein said relay server manages the facsimile
machines to be connected in accordance with identifying
information specific to each facsimile machine.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Belongs] The present invention relates to a facsimile system that carries out real time facsimile communication using an outside network such as the Internet by facsimile machines connected to a local system.

[0002]

[Prior Art] In recent years, the Internet facsimile communication where images are transmitted/received by using the Internet has been carried out. As a method of such communication, a method in which images are forwarded in a format of an electronic mail or the like is used. However, this method is not capable of carrying out real time communication.

[0003] Although a method of carrying out real time communication using the Internet has been developed, it is necessary for a facsimile machine to accept a connection demand from another facsimile machine in order to receive communication. For that purpose, it is necessary that facsimile machines have a function as a server and obtain a global IP address to allow the machines to be specified from the Internet.

[0004] However, in systems of many companies, a gateway device collectively carries out connection between an in-house local system and the Internet, and more companies employ a constitution that all in-house network devices are connected to the local system. In such a system constitution, facsimile machines are also required to be connectable to the local system.

[0005] Fig. 4 is an explanatory view showing an example facsimile machines re connected to local systems. In the figure, reference numbers 1, 2 are local systems, 3 is the Internet, 11, 21, are terminals, 12, 22 are facsimile machines, 13, 23

are gateways, and 14, 24 are LAN. The local system 1 is constructed by the terminal 11, the facsimile machine 12, the gateway 13 or the like being connected by the LAN 14. The gateway 13 is connected to the Internet 3 along with the LAN 14, and converts a private IP address in a local system 1 into a global IP address in the Internet 3. Accordingly, one can use the Internet from various network devices such as the terminal 11, the facsimile machine 12 or the like on the LAN 14. Moreover, the local system 2 is also constructed in the same manner such that it is constructed by the terminal 21, the facsimile machine 22, the gateway 23 or the like being connected by the LAN 24. The gateway 23 is connected to the Internet 3 along with the LAN 24, and converts a private IP address in a local system 2 into a global IP address in the Internet 3. Accordingly, one can use the Internet from various network devices such as the terminal 21, the facsimile machine 22 or the like on the LAN 24. Needless to say, in each of the local system 1 and the local system 2, other various devices are connected by the LAN 14 and the LAN 24.

[0006] In such system, generally, one global IP address or a plurality of global IP addresses is assigned to the local system 1 and the local system 2 but the global IP address is not necessarily assigned to each network device within the local system 1 and the local system 2. A private IP address is assigned to each network device within each of the local system 1 and the local system 2, and the private IP address is converted into the global IP address by using functions such as NAT or IP masquerade by the gateway 13 and the gateway 23. By using the gateway 13 and the gateway 23 including such IP address

converting function, for example in the local system 1, the terminal 11 and the facsimile machine 12 are to use the Internet 3 via the gateway 13. In addition, in the local system 2 the terminal 21 and the facsimile machine 22 are to use the Internet 3 via the gateway 23.

[0007] Moreover, the gateway 13, the gateway 23 or other network devices or the like includes a function such as a fire wall or a proxy server, and a structure, in which terminal uses the Internet 3 via these devices, is used, and the safety in the system is improved.

[0008] For example, when one attempts to transmit an image to the facsimile machine 12 within the local system 1 from the Internet 3, the global IP address of the gateway 13 can be learned. However, the private IP address of the facsimile machine 12 cannot be learned. Therefore, in the general connecting method, the facsimile machine 12 cannot be accessed from outside of the local system 1. In other words, the facsimile machine 12 cannot receive the image sent via the Internet 3.

[0009] Further, there are cases where a fire wall function or the like of the gateway 13 limits websites from which access is accepted, and such a function also limits the receiving of images by the facsimile machine 12. Of course, the same applies to the facsimile machine 22 in the local system 2.

[0010] As described, when a facsimile machine, which carries out facsimile communication using the Internet, is connected in the local system, there existed a problem that it could not receive communication from another facsimile machine via the Internet. Further, if one tries to transmit an image to a facsimile machine in the local system, it was impossible to

transmit the image to a destination because the IP address of the destination was unknown.

[0011]

[Problems to be solved by the Invention] The present invention has been made in consideration to aforementioned circumstance, and the object of the present invention is to provide a facsimile system capable of carrying out real time facsimile communication using the Internet while securing the safety of local systems even if facsimile machines are connected in the local systems.

[0012]

[Means for Solving the Problems] The present invention is a facsimile system having: facsimile machines connected to an inner network; gateway devices for connecting the inner network to an outer network; and a relay server connected to the outer network for relaying communication between the gateway devices, in which the facsimile machines send and receive an image by being connected to the relay server via the gateway devices in advance.

[0013] Further, the present invention is a facsimile system having: the facsimile machines connected to the inner network; gateway devices for connecting the inner network to the outer network; and a plurality of relay servers connected to the outer network, in which the relay server carry out communication with one or a plurality of gateway devices and one or a plurality of other relay servers to relay between the gateway devices, and the facsimile machines send and receive an image by being connected to any one of the relay servers via the gateway devices in advance.

[0014] By connecting the facsimile machines to the relay server via the gateway devices in advance, communication between the relay server and the facsimile machines in both directions are realized. Therefore, even when images are received from another facsimile machine, they can be received without a problem by relaying the images by the relay server. Of course, even when transmitting images, they can be transmitted without a problem.

[0015] Further, the relay server can manage the facsimile machines to be connected in accordance with identifying information specific to each facsimile machine. Because it is impossible to identify a facsimile machine receiving images by the IP address as described above, it becomes possible for a facsimile machine sending images to specify the facsimile machine receiving images by using the identifying information. Further, by registering the identifying information in advance, the safety of the local system can be also secured such that connection of an unauthorized device sending images, which is not registered, is eliminated.

[0016]

[Embodiments of the Invention]

Fig. 1 is a constitution figure showing a first embodiment of the facsimile system of the present invention. In the figure, for the same part as the part of Fig. 4, the same reference number is to be applied and the repetitive description will be abbreviated. The reference number 4 is a relay server, 41 is a communication unit, and 42 is a connection information holding unit. The relay server 4 is connected to the Internet 3, and includes a global IP address. By accepting a log-in demand to

the global IP address from the network device, the connection with the network device is to be maintained and the communication path is to be secured. Such connection is to be maintained with a plurality of network devices. Then, when transmitting facsimile from a first facsimile machine to a second facsimile machine, the relay server 4 receives the image by using the communication path between the first facsimile machine and the relay server 4, and the relay server 4 further transmits the image by using the communication path between the relay server 4 and the second facsimile machine. By relaying the communication between the first facsimile machine and the second facsimile machine in such a manner, the communication between the first facsimile machine and the second facsimile machine can be realized.

[0017] For example, although the connection can be made from the relay server 4 to the gateway 13 within the local system 1, it cannot be connected to the terminal 11 or the facsimile machine 12. However, by using the global IP address of the relay server 4, it can be connected to the relay server 4 from the terminal 11 or the facsimile machine 12 via the gateway 13. Therefore, by demanding log-in to the relay server 4 from the facsimile machine 12, the communication in both directions can be carried out between the relay server 4 and the facsimile machine 12 which demanded the log-in. In the same manner, although the connection can be made from the relay server 4 to the gateway 23 within the local system 2, it cannot be connected to the terminal 21 or the facsimile machine 22. However, by using the global IP address of the relay server 4, the connection can be made to the relay server 4 via the gateway 23 from the

terminal 21 or the facsimile machine 22. Therefore, by demanding log-in from the facsimile machine 22 to the relay server 4, the communication in both directions can be carried out between the relay server 4 and the facsimile machine 22, which demanded the log-in. Further, as it has been described by referring to Fig. 4, the communication cannot be carried out directly between the facsimile machine 12 and the facsimile machine 22.

[0018] For example, when the communication path is established by the facsimile machine 12 within the local system 1 and the facsimile machine 22 within the local system 2 by demanding log-in to the relay server 4, the relay server 4 is capable of carrying out the communication in both directions with the facsimile machine 12, and the communication in both direction with the facsimile machine 22. When the relay server 4 receives a communication demand from the facsimile machine 12 to the facsimile machine 22, the relay server 4 receives the image transmitted from the facsimile machine 12 and transmits the received data to the facsimile machine 22. Thus, the facsimile transmission from the facsimile machine 12 to the facsimile machine 22 is carried out. On the contrary, the relay server 4 is also capable of receiving the image transmitted from the facsimile machine 22 and then transmitting the received image to the facsimile machine 12. In such a manner, the facsimile communication between the facsimile machine 12 and the facsimile machine 22 can be realized.

[0019] The relay server 4 can be constructed by including the communication unit 41 and connection information holding unit 42. The communication unit 41 is capable of communicating with

a plurality of facsimile machines via the Internet 3. In addition, when the communication unit 41 receives the connection demand information from the facsimile machine which is communicably connected, following the connection demand information, the unit relays the forwarding of the image between the facsimile machine which is communicably connected and a facsimile machine which demanded the connection. For example, when the facsimile machine 12 and the facsimile machine 22 are communicably connected by the communication unit 41 respectively, and the communication unit 41 receives the connection demand information with the facsimile machine 22 from the facsimile machine 12, the image is forwarded between the facsimile machine 12 and the communication unit 41 and the image is also forwarded between the communication unit 41 and the facsimile machine 22, and as a result, the communication can be carried out substantially between the facsimile machine 12 and the facsimile machine 22. Of course, it is possible to secure a plurality of connections with one facsimile machine, and the communication can be carried out with a plurality of facsimile machines by using a plurality of connections.

[0020] The connection information holding unit 42 holds the connection information of the facsimile machine which is capable of communicating by the communication unit 41, and can be used in the certification or when the communication unit 41 carries out the communication by being connected to the facsimile machine or in checking a connection state. The connection information includes identifying information such as the user ID and the password, for example, and when receiving the connection demand from the facsimile machine, the

certification can be carried out by receiving the identifying information such as the user ID and the password, and it is determined whether or not the communication can be carried out. Moreover, various setting information or the like in the communication can be included in the connection information. Furthermore, information such as whether or not the registered facsimile logged in and the communication path is secured or whether or not the communication is being carried out with another facsimile machine can be held as a connection state.

[0021] Fig. 2 is a sequence diagram showing an example of the communication procedure in a first embodiment of a facsimile system of the present invention. The communication procedure shown in Fig. 2 is carried out by using TCP/IP, and the connection with the relay server 4, the maintenance of the connection, the connection demand to the facsimile machine, the data forwarding to the facsimile machine, the termination of the connection with the facsimile machine, and the termination of the connection with the relay server or the like is carried out. As an example, it is shown of the case in which the communication is carried out between the facsimile machine 12 within the local system 1 and the facsimile machine 22 within the local system 2 of Fig. 1. The facsimile machine 12 and the facsimile machine 22 are to be registered as a user to the relay server 4 in advance. As the information of registration, there are the user ID, the password or the like. These pieces of identifying information are to be held as a part of the connection information by the connection information holding unit 42.

[0022] When, after being activated or directed by an operator for example, is connected to the relay server 4 via the gateway

13, the facsimile machine 12 performs log-in and establishes TCP/IP connection (connection 1) with the relay server 4 in the process (1). Since the facsimile machine 12 is a network device within the local system 1, the communication cannot be carried out directly from the relay server 4, but the connection can be made to the relay server 4 by the log-in from the facsimile machine 12 which is a client. Since TCP/IP connection is capable of data communication in both directions, the communication can be carried out from the facsimile machine 12 to the relay server 4, or from the relay server 4 to the facsimile machine 12 when the facsimile machine 12 is connected with the relay server 4.

[0023] After the connection 1 is established, the facsimile machine 12 transmits the identifying information such as the user ID and password to the relay server 4 in the process (2). The relay server 4 checks whether or not the identifying information such as the received user ID and the password are held as the connection information in the connection information holding unit 42, and carries out the certification of the facsimile machine 12. By this certification, the connection with an unspecified third party can be prevented, and the safety of the local system can also be secured. In the case of failing to make the certification in that the identifying information such is not registered as the connection information or that the password is not correct for example, the relay server 4 carries out negative response to the facsimile machine 12, or disconnects the connection 1 as it is. When the certification is succeeded, positive response is carried out in the process (3), and the server controls the

connection 1 to be maintained until the connection 1 is disconnected.

[0024] When TCP/IP connection with the relay server 4 is established and the certification is obtained, the facsimile machine 12 periodically sends a command to hold the connection to the relay server 4 to maintain the connection (connection 1) in the process (4), and obtains the response of confirmation from the relay server 4 in the process (5). The connection is to be held accordingly, and it is confirmed that the relay server is operating normally.

[0025] As in the same manner, the facsimile machine 22 makes connection to the relay server 4 via the gateway 23, performs log-in, and establishes TCP/IP connection (connection 2) with the relay server 4 in the process (1'). Since the facsimile machine 22 is also the network device within the local system 2, the communication cannot be carried out directly from the relay server 4, connection can be made to the relay server 4 by the log-in from the facsimile machine 22. By the connection 2, the communication can be carried out from the facsimile machine 22 to the relay server 4, or from the relay server 4 to the facsimile machine 22.

[0026] After the connection 2 is established, the facsimile machine 22 transmits the identifying information such as the user ID and the password to the relay server 4 in the process (2'). The relay server 4 checks whether or not the identifying information such as the received user ID and the password are held as the connection information in the connection information holding unit 42, and carries out the certification of the facsimile machine 22. In the case of failing to make

certification in that the identifying information is not registered as the connection information or that the password is not correct for example, the relay server 4 carries out negative response to the facsimile machine 22, or disconnects the connection 2 as it is. When the certification is succeeded, positive response is carried out in the process (3'), and then, the relay server 4 controls the connection 2 to be maintained until the connection 2 is disconnected.

[0027] When TCP/IP connection with the relay server 4 is established and the certification is obtained, the facsimile machine 22 periodically sends out the command for holding the connection to the relay server 4 to maintain the connection (connection 2), in the process (4'), and obtains the response of confirmation from the relay server 4 in the process (5'). The connection is to be held accordingly, and it is confirmed that the relay server 4 is operating normally.

[0028] Meanwhile, the connection between the facsimile machine 12 and the relay server 4, and the connection between the facsimile machine 22 and the relay server 4, can be carried out at any time if it is before the facsimile communication between the both machines. Moreover, it is necessary that the connection with the relay server 4 be maintained until the communication between the both machines starts.

[0029] When a demand is generated in that the connection is to be made from the facsimile machine 12 to the facsimile machine 22, the facsimile machine 12 specifies the user ID of the facsimile machine 22 to demand the connection in the process (6), and demands the connection to the relay server 4. Since the facsimile machine 22 is a network device in the local system

2, the IP address cannot be obtained. Therefore, although it is impossible to specify the facsimile machine 22 by the IP address, it can be specified by using the user ID. Further, the user ID of the facsimile machine 22, which is to be the connection destination, can be specified by any method such as obtaining in advance or specifying by confirming to a list or the like of the users in the log-in state from the relay server 4. When the facsimile machine 22 corresponding to the specified user ID is not in the log-in state, the relay server 4 returns the error to the facsimile machine 12. Moreover, when the facsimile machine 22 is under the log-in state and the connection is vacant, the relay server 4 transmits a connection demand notification including the information that there is a connection demand to the facsimile machine 22, and the user ID of the facsimile machine 12 which is demanding the connection in the process (7).

[0030] The facsimile machine 22 memorizes that the connection used for the transmission of the connection demand notification is used in the connection with the facsimile machine 12, and responds that it is acceptable in the process (8). Further, when rejecting a connection, the terminal 21 sends back an error. The relay server 4 sends back the response from the facsimile machine 22 to the facsimile machine 12 in the process (9). At this point, when the response from the facsimile machine 22 is a response of acceptability, the server memorizes that the connection 1 and the connection 2 are to be used in the communication between the facsimile machine 12 and the facsimile machine 22 respectively. Moreover, in the facsimile machine 12, which received the response from the facsimile

machine 22, when receiving the response of acceptability, the connection in use (connection 1) is memorized as the connection to be used in the communication with the facsimile machine 22.

[0031] After it is confirmed of carrying out the communication between the facsimile machine 12 and the facsimile machine 22 in the manner stated above, the image is to be transmitted actually on and after the process (15). Further, in the example shown in Fig. 2, after it is decided that the communication is to be carried out between the facsimile machine 12 and the facsimile machine 22, a new TCP/IP connection is to be established to the relay server 4 respectively for receiving the connection demand from another facsimile machine and for carrying out the connection demand to another facsimile machine. In other words, the facsimile machine 12 performs the log-in to the relay server 4 to establish TCP/IP connection (connection 3) with the relay server 4 in the process (10), and the facsimile machine 12 transmits the user ID and the password to the relay server 4 in the process (11). The relay server 4 carries out the certification of the facsimile machine 12 by the identifying information such as the received user ID and password, and sends back the response in the process (12). Then, the connection holding command is transmitted from the facsimile machine 12 periodically to the relay server 4 to maintain the connection 3 in the process (13), and the relay server 4 sends back the response to the facsimile machine 12 in the process (14). As in the same manner, the facsimile machine 22 performs the log-in to the relay server 4 to establish TCP/IP connection (connection 4) with the relay server 4 in the process (10'), and the facsimile machine 22 transmits the identifying information such as the

user ID and the passwords to the relay server 4 in the process (11'). The relay server 4 carries out the certification of the facsimile machine 22 by the identifying information such as the received user ID and the password, and sends back the response in the process (12'). Then, to maintain the connection 4, the connection holding command is transmitted from the facsimile machine 22 periodically to the relay server 4 in the process (13'), and the relay server 4 sends back the response to the facsimile machine 22 in the process (14'). Further, if it is not necessary to maintain such vacant connection, the processes of (10) to (14), or (10') to (14') are not necessary. Moreover, in the case where a plurality of connections has already been secured, these procedures are not required to be carried out.

[0032] When it is confirmed of carrying out the communication between the facsimile machine 12 and the facsimile machine 22 by the procedure of the processes (6) to (9), the facsimile machine 12 transmits the image, which is to be sent to the facsimile machine 22, to the relay server 4 by using the connection 1 in the process (15). The relay server 4 receives the image from the facsimile machine 12, and transmits the received data to the facsimile machine 22 by using the connection 2 in the process (16). The facsimile machine 22 receives the image from the facsimile machine 12 that was transmitted from the relay server 4 through the connection 2, and transmits the response directed to the facsimile machine 12 to the relay server 4 in the process (17). The relay server 4 receives the response directed to the facsimile machine 12 from the facsimile machine 22, and transmits the received response to the facsimile machine 12 through the connection 1

in the process (18).

[0033] In the manner stated above, by relaying the data by the relay server 4 using the connection 1 between the facsimile machine 12 and the relay server 4, and the connection 2 between the facsimile machine 22 and the relay server 4, the communication can be carried out between the facsimile machine 12 and the facsimile machine 22. Further, the image forwarding from the facsimile machine 12 to the facsimile machine 22 by the processes (15) to (18) may be repeated several times. Moreover, the image may be forwarded from the facsimile machine 22 to the facsimile machine 12.

[0034] When the image forwarding between the facsimile machine 12 and the facsimile machine 22 is completed, the termination notification is carried out from the facsimile machine 12 or the facsimile machine 22. It is to be supposed that the termination notification is carried out from the facsimile machine 12, and the facsimile machine 12 transmits the termination notification directed to the facsimile machine 22 to the relay server 4 by using the connection 1 in the process (19). The relay server 4 transmits the termination notification to the facsimile machine 22, which was received from the facsimile machine 12, to the facsimile machine 22 by using the connection 2 in the process (20).

[0035] Meanwhile, after the facsimile machine 12 is connected with the facsimile machine 22, a communication procedure to the termination notification is arbitrary. For example, a procedure in a general real time Internet facsimile machine can be applied.

[0036] Then, the facsimile machine 12 which transmitted the

termination notification transmits, the releasing notification indicating that the connection 1 has become vacant to the relay server 4 in the process (21). Moreover, the facsimile machine 22 which received the termination notification also transmits, the releasing notification indicating that the connection 2 has become vacant to the relay server 4 in the process (21'). Accordingly, the relay server 4 memorizes that the connection 1 and the connection 2 are not to be used in the communication between the facsimile machine 12 and the facsimile machine 22 and that the connections have become vacant. Further, in this example, the response to the termination notification is not carried out, but it may be made to send back the response.

[0037] In the connection 1 and the connection 2 which were released in such a manner are maintained, the connection holding command and the response periodically as shown in the process (4), (5), or (4'), (5') are carried out, and the connection is maintained between the facsimile machine 12 and the relay server 4, and between the facsimile machine 22 and the relay server 4.

[0038] Further, at the time being, the connection 1 and the connection 3 are secured between the facsimile machine 12 and the relay server 4. As in the same manner, the connection 2 and the connection 4 are secured between the facsimile machine 22 and the relay server 4. This may be left in this state or the connection 1 and the connection 2 may be disconnected when releasing these connections. Of course, the connection 1 and the connection 2 may be continued and the connection 3 and the connection 4 may be disconnected.

[0039] When the facsimile machine 12 shuts down the power source or stops the connection to the relay server 4, the facsimile machine 12 notifies the log-out to the relay server 4 in the process (22). At the time being when a plurality of connections are secured, any connection may be used. Then, the facsimile machine 12 disconnects all the connections to complete. Since the connection 1 and the connection 3 are secured for the facsimile machine 12 in this example, the connection 1 is to be disconnected to complete in this process (23), and the connection 3 is to be disconnected to complete in the process (24). The relay server 4 receives the notification of the log-out from the facsimile machine 12, recognizes the log-out of the facsimile machine 12 and disconnects all the connections (connection 1, and connection 3) with the facsimile machine 12. Further, the same applies to the facsimile machine 22.

[0040] By carrying out the procedure described above, the communication can be carried out even in the case where each or either one of the devices is the network device in the local system. Meanwhile, the procedure for carrying out the connection with the relay server 4 as described above, the maintenance of the connection, the connection demand to the facsimile machine, the data transmission to the facsimile machine, the termination of the connection with the facsimile machine, and the termination of the connection with the relay server 4 can be constituted so as to keep transparency and not to influence command or data to be exchanged by an application protocol working in the upper state, and the communication can be carried out by using the existing application protocol as it is.

[0041] Fig. 3 is a constitution figure showing a second embodiment of the facsimile system of the present invention. In the figure, for the same part with Fig. 1, same reference number is to be applied and the repetitive description will be abbreviated. Reference number 5 is a relay server. In the above-described example, an example was shown where facsimile machines carrying out facsimile communication were connected with the same relay server. However, not limited to this, by carrying out data forwarding between relay servers, facsimile communication can be carried out between facsimile machines connected to different relay servers. In Fig. 3, an example is shown where the relay server 4 and a relay server 5 carry out communication. Of course, a constitution where more relay servers exist and communication is carried out among them may be also acceptable. Alternatively, a constitution where relay is sequentially carried out by 3 or more relay servers is also acceptable.

[0042] The relay server 5 has the same constitution as the relay server 4, the servers are connected to the Internet 3, and severally have a global IP address. Further, it is assumed that the communication path is secured between the relay server 4 and the relay server 5. The network device may be connected to any relay server. In the example shown in Fig. 3, an example is shown where the communication path is secured from the facsimile machine 12 in the local system 1 to the relay server 4 via the gateway 13 and from the facsimile machine 22 in the local system 2 to the relay server 5. Note that the relay servers 4, 5 are severally capable of maintaining connection with a plurality of network devices.

[0043] As described, when the facsimile machine 12 is connected to the relay server 4 to become capable of communication in both directions and the facsimile machine 22 is connected to the relay server 5 to become capable of communication in both directions, communication between the facsimile machine 12 and the facsimile machine 22 can be carried out by using the communication between the relay server 4 and the relay server 5. In other words, in the case of transmitting an image from the facsimile machine 12 to the facsimile machine 22, the image is transmitted from the facsimile machine 12 to the relay server 4 first. The relay server 4 forwards the image received from the facsimile machine 12 to the relay server 5. The relay server 5 having received the forwarding of the image transmits the image to the facsimile machine 22. In this manner, the image can be transmitted from the facsimile machine 12 to the facsimile machine 22.

[0044] Note that a communication procedure in carrying out such a facsimile communication can be performed in a similar manner as the one shown in Fig. 2 above. In the case of transmitting the image from the facsimile machine 12 to the facsimile machine 22 in the example shown in Fig. 3, when the relay server 4 forwards the data to the facsimile machine 22, the server sends the data to the relay server 5 and the relay server 5 should forward it to the facsimile machine 22. Further, the data forwarded from the facsimile machine 22 is sent to the relay server 4 via the relay server 5, and transmitted to the facsimile machine 12. Procedure other than this is substantially the same.

[0045] When carrying out facsimile communication in this

procedure, in a system where a large number of relay servers exist, a relay server to which a facsimile machine transmitting data is connected needs to know which relay server a facsimile machine to be communicated is connected. For example, by specifying each relay server from the facsimile machine transmitting data, the image can be relayed from each relay server.

[0046] However, in order to specify the relay server from the facsimile machine transmitting data, a user needs to know which facsimile machine is connected to which relay server and communication among the relay servers as well. As a method in which such a load to the user is lightened and communication can be realized only by specifying the ID of a facsimile machine to be communicated, routing by the relay servers is considered. For example, each relay server can be constituted that it holds the information (connection information) of a facsimile machine connected to each relay server, and updated connection information is distributed to other relay servers every time when the connection information is changed. This makes it possible to always grasp which facsimile machine is connected to each relay server, a relay server to which the facsimile machine to be communicated is connected can be easily found when receiving the connection demand. Further, it is also possible to know even the connection state of the facsimile machines connected to different relay servers, whether connection should be permitted or not can be determined without inquiring other relay servers in making a connection demand, for example. Moreover, it is also possible to provide various services such that a list of facsimile machines communicable in all relay

servers is provided.

[0047] Further, a constitution is also acceptable that the communication information held in each relay server is collectively managed by a data server, for example. In this case, the relay server inquires the data server to carry out certification to the facsimile machine at the time of log-in, or a relay server to be communicated should be found. Further, when the communication information of the facsimile machine being connected is changed, updating of the communication information should be requested to the data server. Accordingly, all relay servers share and use the communication information. In this case as well, it is possible to know the connection state of a facsimile machine connected to any relay server, whether connection can be carried out or not can be determined without inquiring other relay servers in making a connection demand, for example. Further, it is also possible to provide various services such that a list of facsimile machines communicable in all relay servers is provided.

[0048]

[Effect of the Invention] As it is clear from the description above, according to the present invention, since a communication path is secured by connecting network devices in a local system to a relay server in advance and data is relayed by using the communication path, facsimile can be received in real time from outside even in a constitution where the facsimile machines are connected to local systems. Further, the safety of local system can be secured by carrying out certification in connecting to the relay server. Moreover, in the case where a plurality of relay servers exist, it becomes

possible to carry out facsimile communication even between facsimile machines connected to different relay servers by carrying out communication among the relay servers. According to the present invention, various effects are exerted as described above in addition to this.

[Brief Description of the Drawings]

[Fig. 1] A constitution figure showing a first embodiment of a facsimile system of the present invention.

[Fig. 2] A sequence diagram showing an example of the communication procedure of the communication system according to the first embodiment of the facsimile system of the present invention.

[Fig. 3] A constitution figure showing a second embodiment of the facsimile system of the present invention.

[Fig. 4] An explanatory view showing an embodiment of a system in which facsimile machines are connected to local systems.

[Explanation of Reference Code]

1, 2: Local system

3: Internet

4, 5: Relay server

11, 12, 21, 22: Terminal

13, 23: Gateway

14, 24: LAN

41: Communication unit

42: Connection information holding unit

Continued from the front page.

F term (reference)

5C062

AA02 AA05 AA13 AA27 AA29 AA35 AB42 AC38 AC43 AE14 AF12 BA00

5C075

AA90 AB90 CD07 EE02 FF90

5K030

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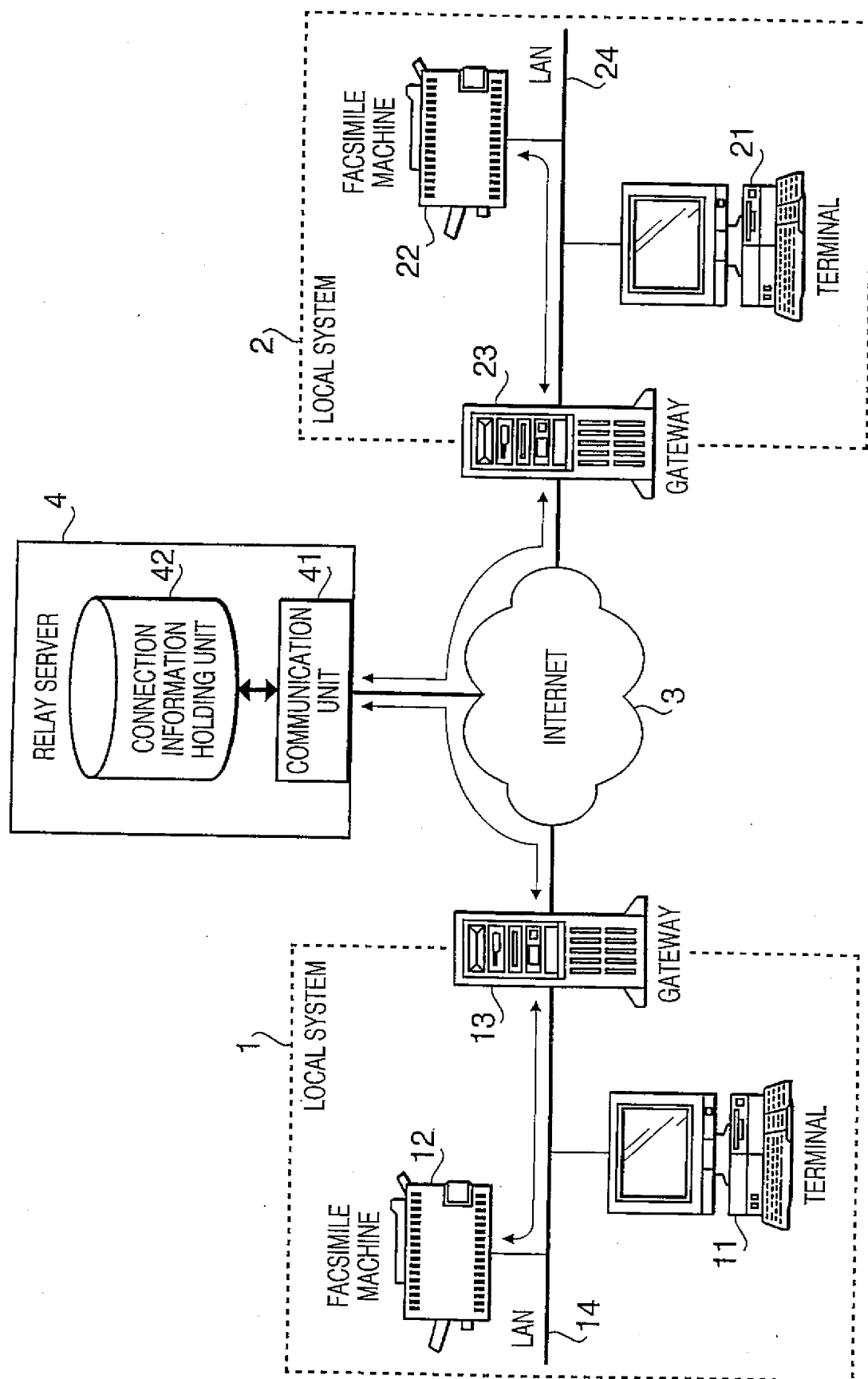


FIG. 1

FACSIMILE MACHINE 12

RELAY SERVER 4

FACSIMILE MACHINE 22

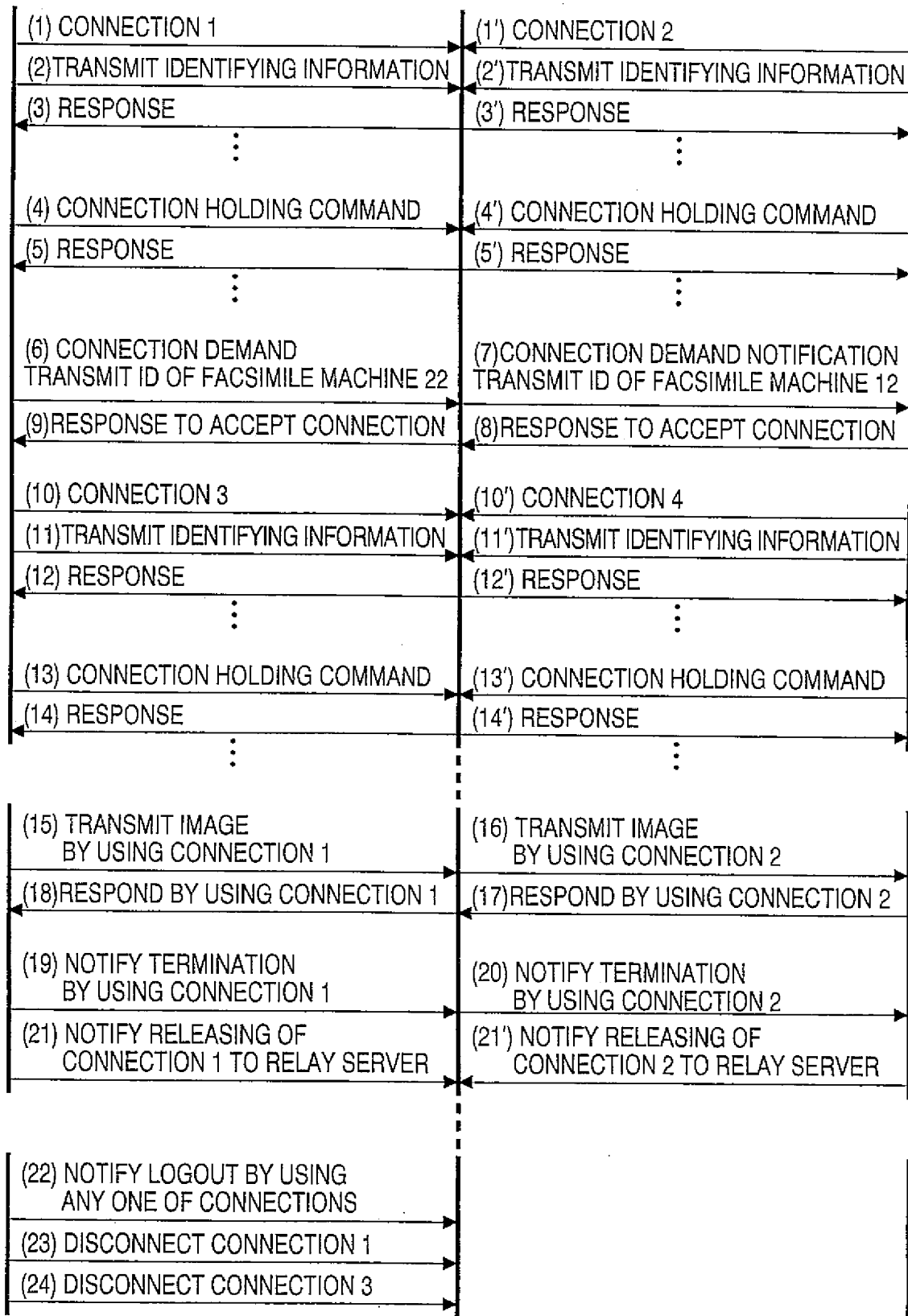
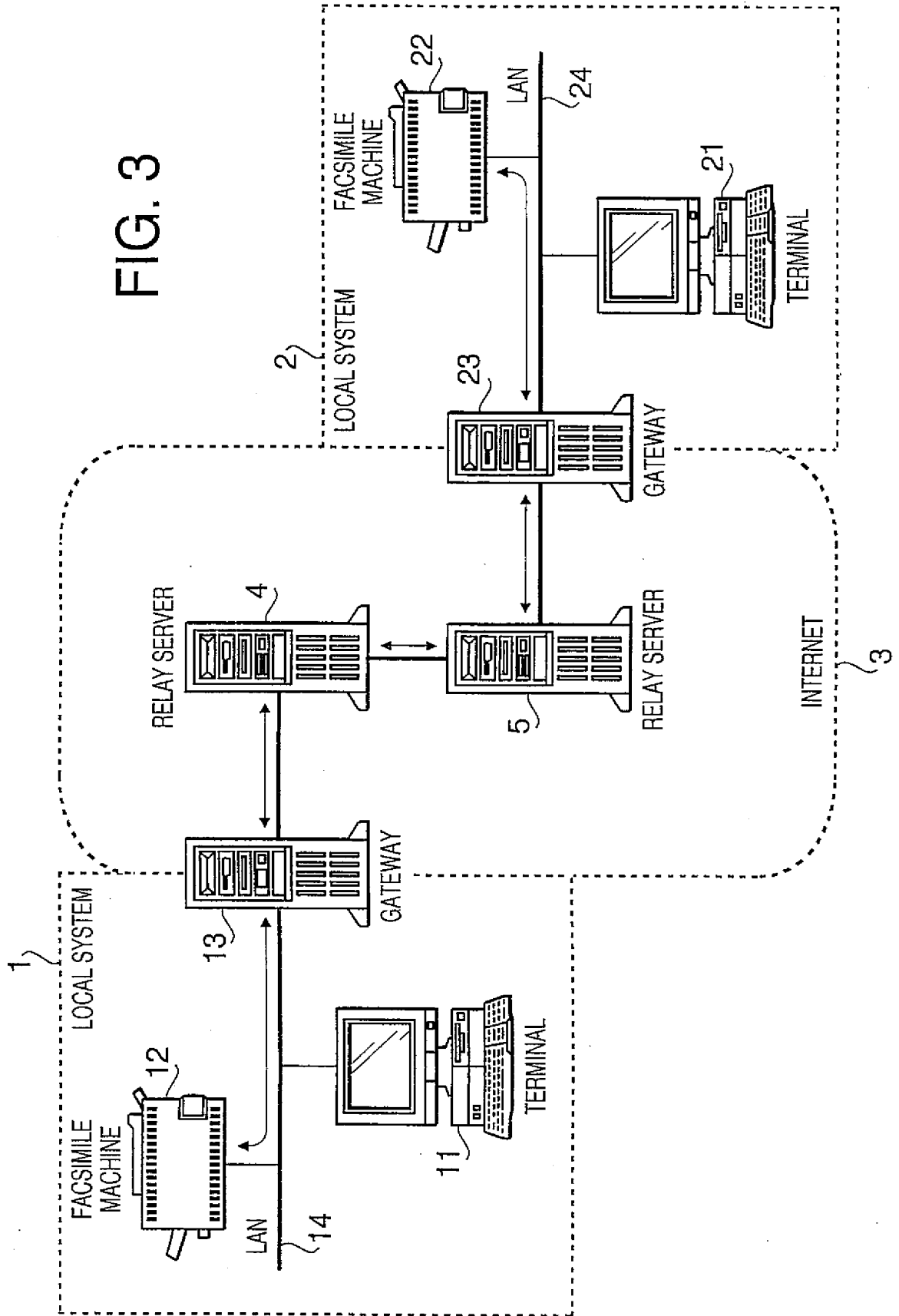


FIG. 2

FIG. 3



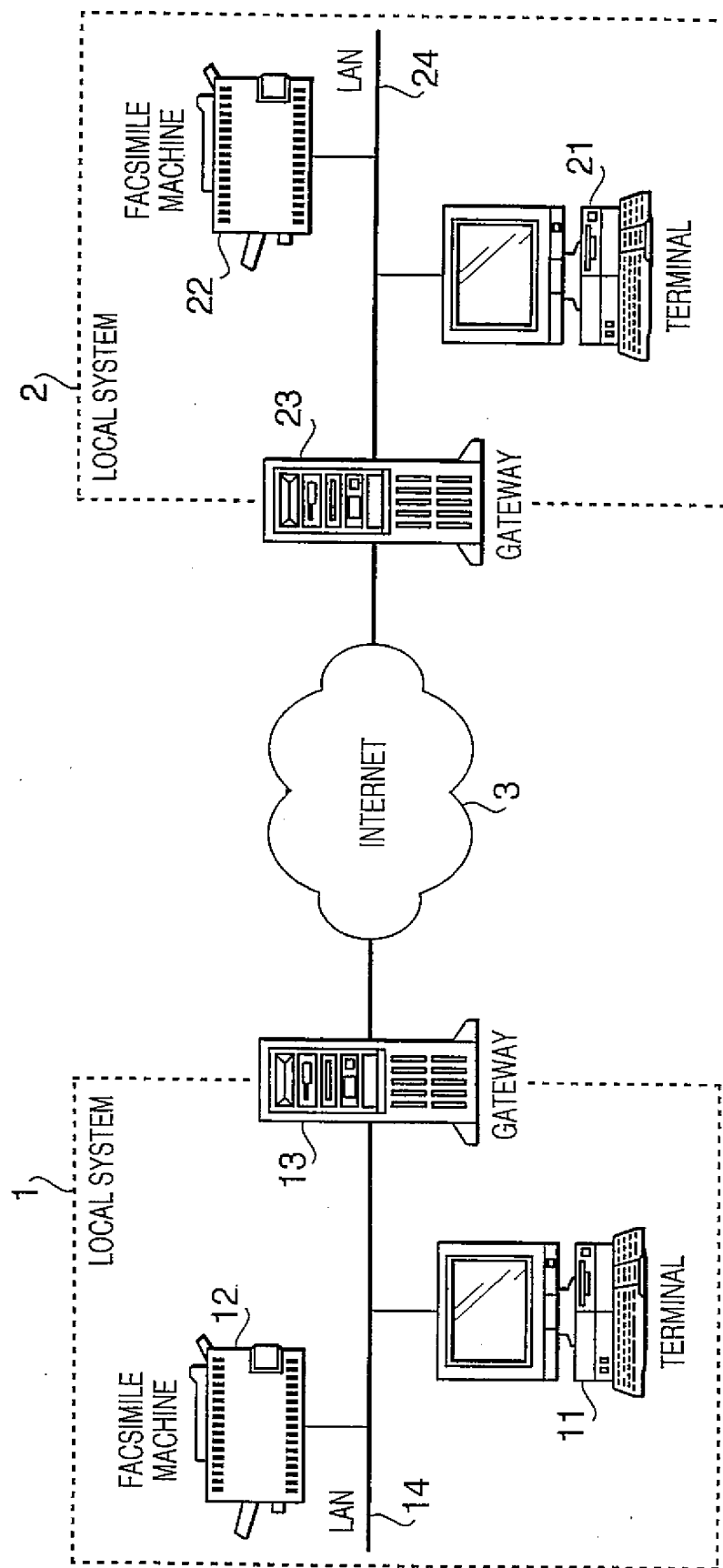


FIG. 4